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Experimenting seismological and GNSS equipment in extreme conditions in preparation for complex studies in the area of the Bulgarian Antarctic Base

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Study of seismicity and Earth's structure on Livingston Island and surrounding area is carrying out in the frame of the project "Creating an information base for study of seismicity and Earth's structure on Livingston island and surroundings through complex research in the Bulgarian Arctic Base area" supported by the Science Research Fund to Bulgarian Ministry of Education and Science for a period of 2 years including two Antarctic expeditions. The main goal of the project is to carry out a complex seismological and geodetic research based on data recorded by broadband seismic station and 2 GNSS receivers, which will be installed near the Bulgarian Antarctic Base on Livingston Island. Additionally, the velocity of the Perunica glassier (Livingston Island) will be estimated by processing and analyzing of GNSS data.
The seismic station and GNSS receivers were installed on Vitosha Mountain, near Sofia, and were working during the winter to test the performance of the equipment in extreme weather conditions similar to the Antarctic climate. The seismological equipment included CMT40T seismometer and Reftek 130 digitizer. A thermo isolating cover was used to protect the seismic station. The power was supplied by a set of special batteries. The recorded seismological and geodetic data were stored into memory cards inside the apparatus.
McNamara method was used to study ambient seismic noise. Effects of harsh weather conditions (wind, snowing, reining, low temperatures) and absence of man-made noise on the distribution of the noise power are investigated. Registered signals and noise power distribution were compared with records and noise power distribution of seismic station Vitosha (VTS). The result was used to estimate and improve the performance of the equipment.
Registered seismic events were localized by application of Gallitzin method. A software for localization of the events on the base of three component registration was developed and tested. . Software was tuned by comparison of the results with locations estimated by National Data Center of Bulgarian Seismological Network.
The performance of the 2 GNSS receivers (stability, accuracy, variability) in the harsh weather conditions was estimated. Respectively, reliability and duration of battery was tested.